

## **APPENDIX G2: CONSTRUCTION EMISSION ESTIMATES**

This appendix provides summaries of construction emission estimates for projects proposed under the Proposed Action or the RLA Alternative. The appendix includes the fugitive dust and vehicle emission rate database used in the analysis plus summaries of annual construction emissions by installation. Summaries for the military vehicle trail construction projects include summaries of equipment use estimates by construction stage.

The detailed spreadsheets documenting the equipment emission rate database and the components of the emission calculations generally do not lend themselves to hard copy printing. Electronic versions of the spreadsheets can be made available on request.

#### DEFAULT CONSTRUCTION SITE FUGITIVE DUST EMISSION RATE ESTIMATES:

AP-42 5th Ed., Sect. 13.2.3 assumption:	1.2 80.00	TSP tons/acre-month, assuming <b>30</b> single-shift work days per month TSP pounds/acre/workday, single shift
CARB Area Source Methodology, Section 7	7.7 (adjusted for n	no control measures):
Simple site grading, but no major	0.3432	TSP tons/acre-month, assuming 21 single-shift work days per month
cut-and-fill or excavation activity:	32.69	TSP pounds/acre/workday, single shift
•	0.22	PM10 tons/acre-month, assuming 21 single-shift work days per month
	20.95	PM10 pounds/acre/workday, single shift
With major excavation & earthmoving:	1.3104	TSP tons/acre-month, assuming 21 single-shift work days per month
_	124.80	TSP pounds/acre/workday, single shift
	0.84	PM10 tons/acre-month, assuming 21 single-shift work days per month
	80.00	PM10 pounds/acre/workday, single shift

Note: CARB estimates range from 40.9% to 156% of the generalized AP-42 daily TSP rate.

All data reflect typical loam type soil conditions. Loess deposits, peat soils, or poorly consolidated volcanic ash deposits can have significant wind erosion rates in addition to fugitive dust associated with direct disturbance by construction activity.

The data account for typical on-site construction activities, including site clearing, grading, foundation excavation, on-site vehicle traffic. etc.

If the project will require substantial off-site excavation of fill material from major borrow areas, emissions associated with borrow pit excavation, truck loading, and off-site unpaved haul road traffic may warrant additional separate analysis. Small quantity off-site borrow pit activities and low volume haul road traffic may not warrant additional analysis, since the data are quite generalized to begin with.

The EPA estimate is based on TSP monitoring procedures at shopping center and apartment construction sites, and assumes 30 single-shift workdays per month.

CARB estimates are based on site activity data from construction projects in California and Nevada. Site activity was evaluated using EPA operation-specific emission factors to arrive at the overall PM10 emission rate estimates for construction activity. CARB assumes that standard dust control practices provided 50% dust control at the monitored project sites. The data above have been adjusted to uncontrolled factors.

CARB assumes that PM10 accounts for about 64% of fugitive TSP (PM10\*1.56 = TSP). The CARB TSP estimates presented above are back-calculated values.

Given the procedures used to derive the CARB emission rate estimates, it should be valid to use the estimated TSP rates in combination with a project-specific PM10 fraction based on soil conditions.

NOTE: If using the CARB PM10 emission rate estimates directly, set the PM10 Portion of Fugitive Dust to 100%.

CARB also assumes 5 day/week construction activity (about 21 days/month) instead of the EPA assumption of 30 days/month. The low range of CARB estimates is for typical residential, commercial, or office development with site grading but no major excavation or cut and fill earthmoving.

The high end of the CARB estimate is for major construction operations with substantial earthmoving activity.

#### Sources:

U.S. Environmental Protection Agency. 1995. Compilation of Air Pollutant Emission Factors (AP-42) 5th Edition, Volume I, Section 13.2.3. California Air Resources Board. 1997. Building Construction Fugitive Dust. Section 7.7 in Area Source Methodologies document (downloaded from CARB website; area source methodologies page: www.arb.ca.gov/emisinv/areasrc/areameth.htm; area source methodologies, Chapter 7 index page: www.arb.ca.gov/emisinv/areasrc/index7.htm).

DEFAULT PM10 FRACTION ESTIMATES	DEFAULT PM10 FRACTION ESTIMATES FOR FUGITIVE DUST										
SOIL TEXTURE CLASS	PERCENT CLAY	PERCENT SILT	PERCENT SAND	PERCENT CLAY + SILT	ESTIMATED % PM10						
Silt and Clay Soils:											
Clay	40 - 100 %	0 - 60 %	0 - 45 %	55 - 100 %	45 - 85 %						
Silt	0 - 10 %	80 - 100 %	0 - 20 %	80 - 100 %	40 - 80 %						
Silty Clay	40 - 60 %	40 - 60 %	0 - 20 %	80 - 100 %	40 - 70 %						
Silty Clay Loam	28.5 - 40 %	40 - 72.5 %	0 - 20 %	80 - 100 %	40 - 70 %						
Loamy Soils:											
Silty Loam	0 - 28.5 %	50 - 87.5 %	0 - 50 %	50 - 100 %	30 - 70 %						
Clay Loam	28.5 - 40 %	15 - 52.5 %	20 - 45 %	55 - 80 %	35 - 60 %						
Loam	7.5 - 28.5 %	30 - 50 %	25 - 52.5 %	47.5 - 75 %	30 - 50 %						
Sandy Clay	35 - 55 %	0 - 17.5 %	45 - 65 %	35 - 55 %	20 - 40 %						
Sandy Soils:											
Sandy Clay Loam	20 - 35 %	0 - 27.5 %	45 - 80 %	20 - 55 %	15 - 40 %						
Sandy Loam	0 - 20 %	0 - 50 %	42.5 - 85 %	15 - 57.5 %	10 - 35 %						
Loamy Sand	0 - 15 %	0 - 30 %	70 - 90 %	10 - 30 %	5 - 25 %						
Sand	0 - 10 %	0 - 15 %	85 - 100 %	0 - 15 %	0 - 10 %						

#### Notes:

Soil texture classes and associated clay, silt, and sand fractions are based on the U.S. Department of Agriculture soil texture classification system

Clay = soil particles with a sieve diameter below 2 microns (but may form much larger particle aggregates).

Silt = soil particles with a sieve diameter between 2 and 50 microns.

Fine silt: 2 - 10 microns; medium silt: 10 - 20 microns; coarse silt: 20 - 50 microns.

Sand = soil particles with a sieve diameter between 50 and 2,000 microns.

Very fine sand: 50 - 100 microns; fine sand: 100 - 250 microns; medium sand: 250 - 500 microns; coarse sand: 500 - 1000 microns; very coarse sand: 1000 - 2000 microns.

1 micron = 0.001 millimeters = 0.00003937 inches

PM10 = inhalable particulate matter (a size-dependent fractional sampling of particles smaller than 50 microns aerodynamic equivalent diameter). PM10 samplers collect essentially 100% of submicron particles, 50% of 10 micron aerodynamic diameter particles, and 0% of particles larger than 50 microns aerodynamic equivalent diameter.

A sieve diameter is the width of the minimum screen opening (usually square) through which a particle will pass. Because soil particles often have complex shapes, the sieve diameter normally will be larger than the minimum physical dimension and smaller than the maximum physical dimension of the particle.

An aerodynamic equivalent diameter is a mathematical abstraction, not a physical dimension. The aerodynamic equivalent diameter is the diameter of a sphere with unit density (1 gram per cubic centimeter) having the same gravitational settling velocity as the actual particle under consideration. Settling velocities are influenced by physical size and shape, as well as by particle density. In most cases, the aerodynamic equivalent diameter can be approximated by the equivalent spherical diameter (volume diameter) of the particle.

See the USDA National Soil Characterization Database (http://soils.usda.gov/soil\_survey/nscd/main.htm) for more precise size fractions of dominant soil series types.

#### Data Sources:

Wild, Alan. 1993. Soils and the Environment: An Introduction. Cambridge University Press.

Warrick, A. W. 2000. Soil Physics. Pages A-1 through A-17 in Malcolm E. Sumner (ed.), Handbook of Soil Science. CRC Press.

## DEFAULT DUST CONTROL PROGRAM EFFECTIVENESS VALUES:

50%	typical measures, arid areas
65%	aggressive measures, and areas
	,
70%	typical measures, areas with frequent rain
85%	typical measures, areas where natural soils seldom dry out

Note: disturbed areas and soil stockpiles can dry out more readily than natural soils.

Construction site water trucks typically have tank capacities of 500 - 1,200 gallons. A 600 gallon tank is a 2.5 ton load, and a 1,200 gallon tank is a 5 ton load. At 6 mph with a 10-foot spray width, a water truck can cover about 7.3 acres per hour. Tank size and spray intensity will determine acreage covered per tank load. A rate of 600 gallons applied to 5 acres (120 gallons per acre) would be an application depth of 0.11 mm (0.0044 inches); a rate of 300 gallons per acre would be an application depth of 0.28 mm (0.01 inches). Effective dust control in arid areas probably requires cumulative daily application of 600 + gallons per acre (generally in two or more sprinkling passes). It takes 1,070 gallons/acre to achieve a 1 millimeter water application rate.

Water application rate (per pass):
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#### WATER TRUCK ACTIVITY CALCULATIONS:

A	10.5	
Average Area to be Sprinkled on Any Day:	12.5	acres
Daily Number of Sprinkling Passes:	2	passes
Water Application Rate Per Pass:	600	gallons/acre
Average Truck Speed:	5	mph
Average Spray Width:	10	feet
Water Truck Tank Size:	600	gallons
Average Tank Filling Rate:	200	gallons per minute
Average Transit Time Each Way:	3	minutes each way to/from fill location
Average Connect Plus Disconnect Time:	2	minutes per tank fill
Time Required for Tank Refilling:	11	minutes (including travel to/from fill location)
•		
Required Truck Loads Per Day:	25.0	loads
Truck Fills Per Day:	25.0	loads
Acres Sprayed per Tank Load:	1.00	acres per load
Acres Sprayed Per Hour of Driving Time:	6.06	acres per hour
Driving Time per Complete Pass for Site:	2.06	hours
Daily Total Water Truck Operating Time:	8.71	cumulative hours
• •		
Number of Water Trucks Used On Site:	6	trucks
Daily Operating Hours per Truck:	1.45	hours pe r truck
Average Active Hours Per Day Per Truck:	2	hours per day per truck
Average Operating Time Factor per Truck:	73%	hourly operating time factor
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## ANNUAL CONSTRUCTION EMISSIONS, SCHOFIELD BARRACKS CONSTRUCTION PROJECTS

RANGE CONTROL BUILDING  2005 2006 2007 2008 2009 2009 2009 2009 2009 2009 2009				TRUCTION ACTI			
2005   2006   2007   2008   1.10   10.15   4.27   0.92   2.11   2004   2007   2008   2.10   2009   2.22   2.05   0.85   0.19   0.43   2.05   2.06   2.06   2.07   2.06   2.06   2.07   2.06   2.06   2.06   2.07   2.07   2.07   2.07   2.07   2.07   2.07   2.07   2.08   2.009   2	PROJECT	YEAR	ROG	NOx	СО	SOx	PM10
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MULTIPLE DEPLOYMENT FACILITY  MULTIPLE DEPLOYMENT FACILITY  2004 2005 2006 2.38 2009  2008 2007 0.18 1.62 0.72 0.15 1.46 2008 2009  TOTALS BY YEAR  2004 2005 3.01 30.17 12.45 2.76 11.18 2006 5.14 49.50 21.10 4.46 14.24 2007 2.28 21.62 8.97 1.95 8.33 2008 1.76 16.19 6.73 1.46 3.21 2009 0.22 2.05 0.85 0.19 0.43							
MULTIPLE DEPLOYMENT FACILITY  2004 2005 2006 2.38 2007 0.18 1.62 0.72 0.15 1.46 2008 2009   TOTALS BY YEAR  2004 2005 3.01 30.17 12.45 206 11.18 2006 5.14 49.50 21.10 4.46 14.24 2007 2.28 21.62 8.97 1.95 8.33 2008 1.76 16.19 6.73 1.46 3.21 2009 0.22 2.05 0.85 0.19 0.43		2006	1.49	14.64	6.34	1.30	1.72
MULTIPLE DEPLOYMENT FACILITY  2004 2005 2006 2.38 2007 0.18 1.62 0.72 0.15 1.46  2008 2009   TOTALS BY YEAR  2004 2005 3.01 30.17 12.45 2.76 11.18 2006 5.14 49.50 21.10 4.46 14.24 2007 2.28 21.62 8.97 1.95 8.33 2008 1.76 16.19 6.73 1.46 3.21 2009 0.22 2.05 0.85 0.19 0.43		2007	0.17	1.78	0.65	0.16	0.28
MULTIPLE DEPLOYMENT FACILITY  2004 2005 2006 2.38 22.80 9.83 2.06 5.36 2007 0.18 1.62 0.72 0.15 1.46  2008 2009   TOTALS BY YEAR  2004 2005 3.01 30.17 12.45 2006 5.14 49.50 21.10 4.46 14.24 2007 2.28 21.62 8.97 1.95 8.33 2008 1.76 16.19 6.73 1.46 3.21 2009 0.22 2.05 0.85 0.19 0.43		2008					
TOTALS BY YEAR  2004 2005 2009  2.38 22.80 9.83 2.06 5.36 2007 0.18 1.62 0.72 0.15 1.46  2008 2009   TOTALS BY YEAR  2004 2005 3.01 30.17 12.45 2066 5.14 49.50 21.10 4.46 14.24 2007 2.28 21.62 2.897 1.95 8.33 2008 1.76 16.19 6.73 1.46 3.21 2009 0.22 2.05 0.85 0.19 0.43		2009					
TOTALS BY YEAR  2004 2005 2009  2.38 22.80 9.83 2.06 5.36 2007 0.18 1.62 0.72 0.15 1.46  2008 2009   TOTALS BY YEAR  2004 2005 3.01 30.17 12.45 2066 5.14 49.50 21.10 4.46 14.24 2007 2.28 21.62 2.897 1.95 8.33 2008 1.76 16.19 6.73 1.46 3.21 2009 0.22 2.05 0.85 0.19 0.43	MULTIPLE DEPLOVMENT FACILITY	2004					
TOTALS BY YEAR  2004 2005 2006 2007 2008 2009  2009  2004 2005 3.01 30.17 12.45 2006 5.14 2006 5.14 49.50 21.10 4.46 14.24 2007 2.28 21.62 8.97 1.95 8.33 2008 1.76 16.19 6.73 1.46 3.21 2009 0.22 2.05 0.85 0.19 0.43	MODIN EL DEL LOTMENT FACILITI						
TOTALS BY YEAR  2004 2005 3.01 30.17 12.45 2006 5.14 49.50 21.10 4.46 14.24 2007 2.28 21.62 8.97 1.95 8.33 2008 1.76 16.19 6.73 1.46 3.21 2009 0.22 2.05 0.85 0.19 0.43			2.38	22.80	9.83	2.06	5 36
2008 2009  TOTALS BY YEAR  2004 2005 3.01 30.17 12.45 2076 11.18 2006 5.14 49.50 21.10 4.46 14.24 2007 2.28 21.62 8.97 1.95 8.33 2008 1.76 16.19 6.73 1.46 3.21 2009 0.22 2.05 0.85 0.19 0.43							
TOTALS BY YEAR  2004 2005 3.01 30.17 12.45 2006 5.14 49.50 21.10 4.46 14.24 2007 2.28 21.62 8.97 1.95 8.33 2008 1.76 16.19 6.73 1.46 3.21 2009 0.22 2.05 0.85 0.19 0.43			0.10	1.02	0.72	0.13	1.70
2005     3.01     30.17     12.45     2.76     11.18       2006     5.14     49.50     21.10     4.46     14.24       2007     2.28     21.62     8.97     1.95     8.33       2008     1.76     16.19     6.73     1.46     3.21       2009     0.22     2.05     0.85     0.19     0.43							
2005     3.01     30.17     12.45     2.76     11.18       2006     5.14     49.50     21.10     4.46     14.24       2007     2.28     21.62     8.97     1.95     8.33       2008     1.76     16.19     6.73     1.46     3.21       2009     0.22     2.05     0.85     0.19     0.43							
2005     3.01     30.17     12.45     2.76     11.18       2006     5.14     49.50     21.10     4.46     14.24       2007     2.28     21.62     8.97     1.95     8.33       2008     1.76     16.19     6.73     1.46     3.21       2009     0.22     2.05     0.85     0.19     0.43	TOTALS BY YEAR	2004	0.00	0.00	0.00	0.00	0.00
2006     5.14     49.50     21.10     4.46     14.24       2007     2.28     21.62     8.97     1.95     8.33       2008     1.76     16.19     6.73     1.46     3.21       2009     0.22     2.05     0.85     0.19     0.43							
2007     2.28     21.62     8.97     1.95     8.33       2008     1.76     16.19     6.73     1.46     3.21       2009     0.22     2.05     0.85     0.19     0.43							
2009 0.22 2.05 0.85 0.19 0.43		2007	2.28				
TOTAL EMISSIONS 12.42 119.52 50.11 10.82 37.39		2009	0.22	2.05	0.85	0.19	0.43
101AL EMISSIONS 12.42 119.52 50.11 10.82 37.39	TOTAL EMISSIONS		12.42	110.73	50.11	10.02	27.20
	TOTAL EMISSIONS		12.42	119.52	50.11	10.82	37.39

ROG = reactive organic compounds NOx = oxides of nitrogen CO = carbon monoxide

SOx = sulfur oxides

PM10 = inhalable particulate matter (below 50 microns aerodynamic equivalent diameter); the "10" in PM10 is a 50% mass collection efficiency size for sampling devices, not a size limit

Emission estimates include vehicle exhaust emissions and fugitive dust; normal dust control measures assumed.

# ANNUAL CONSTRUCTION EMISSIONS, SCHOFIELD BARRACKS RANGE PROJECTS

YEAR		CONSTRUCTION ACTIVITY EMISSIONS, TONS PER YEAR						
ILAK	ROG	NOx	CO	SOx	PM10			
				4.27	8.15			
					12.19			
					0.50			
					0.00			
					0.00			
2009	0.00	0.00	0.00	0.00	0.00			
2004	2.49	22.93	9.60	2.04	2.88			
2005	0.97	9.48	3.68	0.88	1.19			
2006	0.00	0.00	0.00	0.00	0.00			
2007	0.00	0.00	0.00	0.00	0.00			
2008	0.00	0.00	0.00	0.00	0.00			
2009	0.00	0.00	0.00	0.00	0.00			
2004	3 37	29.90	12.89	2 60	6.76			
					1.29			
					0.00			
					0.00			
					0.00			
					0.00			
2009	0.00	0.00	0.00	0.00	0.00			
2004	0.00	0.00	0.00	0.00	0.00			
2005	2.67	23.81	9.93	2.09	4.22			
2006	0.20	2.04	0.77	0.19	0.27			
2007	0.00	0.00	0.00	0.00	0.00			
2008	0.00	0.00	0.00	0.00	0.00			
2009	0.00	0.00	0.00	0.00	0.00			
					17.79			
					18.89			
					0.78			
2007	0.00		0.00	0.00	0.00			
2008	0.00		0.00	0.00	0.00			
2009	0.00	0.00	0.00	0.00	0.00			
					17.79			
					14.67			
2006	0.21		0.79	0.19	0.50			
2007	0.00	0.00	0.00	0.00	0.00			
2008	0.00		0.00	0.00	0.00			
2009	0.00	0.00	0.00	0.00	0.00			
ATIVE 1	18.79	174.97	72.81	15.61	37.45			
ATIVE 2	15.91	149.12	62.11	13.34	32.97			
	2005 2006 2007 2008 2009 2004 2005 2006 2007 2008 2009 2004 2005 2006 2007 2008 2009 2004 2005 2006 2007 2008 2009 2004 2005 2006 2007 2008 2009	2005         2.88           2006         0.21           2007         0.00           2008         0.00           2009         0.00           2004         2.49           2005         0.97           2006         0.00           2007         0.00           2008         0.00           2009         0.00           2004         3.37           2005         1.02           2006         0.00           2007         0.00           2008         0.00           2009         0.00           2004         0.00           2005         2.67           2006         0.20           2007         0.00           2008         0.00           2009         0.00           2008         0.00           2009         0.00           2004         10.84           2005         7.54           2006         0.41           2007         0.00           2008         0.00           2009         0.00           2004         10.84           2005<	2005         2.88         27.04           2006         0.21         2.03           2007         0.00         0.00           2008         0.00         0.00           2009         0.00         0.00           2004         2.49         22.93           2005         0.97         9.48           2006         0.00         0.00           2007         0.00         0.00           2008         0.00         0.00           2009         0.00         0.00           2004         3.37         29.90           2005         1.02         10.11           2006         0.00         0.00           2007         0.00         0.00           2008         0.00         0.00           2007         0.00         0.00           2008         0.00         0.00           2009         0.00         0.00           2004         0.00         0.00           2005         2.67         23.81           2006         0.20         2.04           2007         0.00         0.00           2008         0.00         0.00	2005         2.88         27.04         10.46           2006         0.21         2.03         0.79           2007         0.00         0.00         0.00           2008         0.00         0.00         0.00           2009         0.00         0.00         0.00           2004         2.49         22.93         9.60           2005         0.97         9.48         3.68           2006         0.00         0.00         0.00           2007         0.00         0.00         0.00           2008         0.00         0.00         0.00           2009         0.00         0.00         0.00           2009         0.00         0.00         0.00           2004         3.37         29.90         12.89           2005         1.02         10.11         3.84           2006         0.00         0.00         0.00           2007         0.00         0.00         0.00           2008         0.00         0.00         0.00           2008         0.00         0.00         0.00           2004         0.00         0.00         0.00      <	2005         2.88         27.04         10.46         2.43           2006         0.21         2.03         0.79         0.19           2007         0.00         0.00         0.00         0.00           2008         0.00         0.00         0.00         0.00           2009         0.00         0.00         0.00         0.00           2004         2.49         22.93         9.60         2.04           2005         0.97         9.48         3.68         0.88           2006         0.00         0.00         0.00         0.00           2007         0.00         0.00         0.00         0.00           2008         0.00         0.00         0.00         0.00           2009         0.00         0.00         0.00         0.00           2009         0.00         0.00         0.00         0.00           2004         3.37         29.90         12.89         2.60           2005         1.02         10.11         3.84         0.93           2006         0.00         0.00         0.00         0.00           2007         0.00         0.00         0.00			

ROG = reactive organic compounds NOx = oxides of nitrogen

CO = carbon monoxide

SOx = sulfur oxides

PM10 = inhalable particulate matter (below 50 microns aerodynamic equivalent diameter); the "10" in PM10 is a 50% mass collection efficiency size for sampling devices, not a size limit

# ESTIMATED EMISSIONS FOR CONSTRUCTION OF DILLINGHAM TANK TRAIL

## **EQUIPMENT USE SUMMARY:**

					OFF-SITE FII	LL HAULING
PROJECT STAGE	ACTIVITY DURATION, DAYS	ACREAGE SUBJECT TO DISTURBANCE	NUMBER OF EQUIPMENT ITEMS	CUMULATIVE HOURS OF EQUIP USE	TRUCK LOADS TO/ FROM SITE	TYPICAL LOADS PER DAY
RIGHT-OF-WAY CLEARING	164	27.9	12	9,832	300	2
ROADBED GRADING	200	30.0	33	26,210	15,666	78
ROAD SURFACING	96	34.7	26	8,947	6,226	66
	0	0.0	0	0	0	0
TOTALS OR AVERAGES:	250	34.7	44	44,989	22,192	89

Linear work progressions with overlap among activity stages reduces the total construction period to about 250 workdays (March 2006 - March 2007).

## TYPICAL CONSTRUCTION DAY EMISSIONS:

		DAILY EMISSIONS, POUNDS PER DAY				
PROJECT STAGE	COMPONENT	ROG	NOx	CO	SOx	PM10
RIGHT-OF-WAY CLEARING	Equipment	25.4	242.8	96.6	21.4	23.2
	Fugitive Dust	0.0	0.0	0.0	0.0	1.9
ROADBED GRADING	Equipment	29.2	311.3	115.6	28.8	29.7
	Fugitive Dust	0.0	0.0	0.0	0.0	3.3
ROAD SURFACING	Equipment	20.8	216.5	74.6	20.0	19.0
	Fugitive Dust	0.0	0.0	0.0	0.0	5.1
	Equipment	0.0	0.0	0.0	0.0	0.0
	Fugitive Dust	0.0	0.0	0.0	0.0	0.0

# CUMULATIVE CONSTRUCTION EMISSIONS:

		CUMULATIVE EMISSIONS, TONS PER YEAR				
PROJECT STAGE	COMPONENT	ROG	NOx	CO	SOx	PM10
RIGHT-OF-WAY CLEARING	Equipment	2.08	19.91	7.92	1.76	1.90
RIGHT-OF-WAT CLEARING	Fugitive Dust	0.00	0.00	0.00	0.00	0.15
ROADBED GRADING	Equipment	2.92	31.13	11.56	2.88	2.97
KONDDED GIGIDING	Fugitive Dust	0.00	0.00	0.00	0.00	0.33
ROAD SURFACING	Equipment	1.00	10.39	3.58	0.96	0.91
	Fugitive Dust	0.00	0.00	0.00	0.00	0.25
	Equipment	0.00	0.00	0.00	0.00	0.00
	Fugitive Dust	0.00	0.00	0.00	0.00	0.00
TOTALS	P	6.00	(1.42	22.06	7.60	5.70
TOTALS	Equipment Fugitive Dust	6.00 0.00	61.43 0.00	23.06 0.00	5.60 0.00	5.78 0.73
	TOTALS	6.00	61.43	23.06	5.60	6.51

# ESTIMATED EMISSIONS FOR CONSTRUCTION OF HELEMANO TANK TRAIL

## **EQUIPMENT USE SUMMARY:**

					OFF-SITE FII	LL HAULING
PROJECT STAGE	ACTIVITY DURATION, DAYS	ACREAGE SUBJECT TO DISTURBANCE	NUMBER OF EQUIPMENT ITEMS	CUMULATIVE HOURS OF EQUIP USE	TRUCK LOADS TO/ FROM SITE	TYPICAL LOADS PER DAY
RIGHT-OF-WAY CLEARING	148	29.7	11	8,836	150	1
ROADBED GRADING	201	38.2	34	21,718	16,557	83
ROAD SURFACING	97	22.4	20	7,658	2,921	31
	0	0.0	0	0	0	0
TOTALS OR AVERAGES:	250	38.2	42	38,212	19,628	79

Linear work progressions with overlap among activity stages reduces the total construction period to about 250 workdays (March 2005 - Marchl 2006).

## TYPICAL CONSTRUCTION DAY EMISSIONS:

			DAILY EMISS	SIONS, POUNDS 1	PER DAY	
PROJECT STAGE	COMPONENT	ROG	NOx	CO	SOx	PM10
RIGHT-OF-WAY CLEARING	Equipment	25.3	241.9	96.4	21.3	23.1
Mont-of-wat CEE/Mixed	Fugitive Dust	0.0	0.0	0.0	0.0	2.8
ROADBED GRADING	Equipment Fugitive Dust	25.1 0.0	265.4 0.0	102.1 0.0	24.5 0.0	25.8 5.3
ROAD SURFACING	Equipment Fugitive Dust	16.3 0.0	171.6 0.0	59.9 0.0	15.9 0.0	15.0 3.2
	Equipment Fugitive Dust	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0

## CUMULATIVE CONSTRUCTION EMISSIONS:

		CUMULATIVE EMISSIONS, TONS PER YEAR					
PROJECT STAGE	COMPONENT	ROG	NOx	CO	SOx	PM10	
RIGHT-OF-WAY CLEARING	Equipment	1.87	17.90	7.13	1.58	1.71	
	Fugitive Dust	0.00	0.00	0.00	0.00	0.21	
ROADBED GRADING	Equipment	2.52	26.67	10.26	2.47	2.60	
	Fugitive Dust	0.00	0.00	0.00	0.00	0.53	
ROAD SURFACING	Equipment	0.79	8.32	2.91	0.77	0.73	
	Fugitive Dust	0.00	0.00	0.00	0.00	0.16	
	Equipment	0.00	0.00	0.00	0.00	0.00	
	Fugitive Dust	0.00	0.00	0.00	0.00	0.00	
TOTALS	Equipment	5.18	52.89	20.30	4.82	5.03	
	Fugitive Dust	0.00	0.00	0.00	0.00	0.90	
	TOTALS	5.18	52.89	20.30	4.82	5.93	

# ANNUAL CONSTRUCTION EMISSIONS, DILLINGHAM TRAINING AREA CONSTRUCTION PROJECTS

		CONST	RUCTION ACTI	VITY EMISSIONS	S, TONS PER YE	EAR
PROJECT	YEAR	ROG	NOx	CO	SOx	PM10
FIXED TACTICAL INTERNET	2004	0.000	0.000	0.000	0.000	0.000
	2005	0.008	0.069	0.029	0.006	0.011
	2006	0.000	0.000	0.000	0.000	0.000
	2007	0.000	0.000	0.000	0.000	0.000
	2008	0.000	0.000	0.000	0.000	0.000
	2009	0.000	0.000	0.000	0.000	0.000
TOTALS BY YEAR	2004	0.000	0.000	0.000	0.000	0.000
	2005	0.008	0.069	0.029	0.006	0.011
	2006	0.000	0.000	0.000	0.000	0.000
	2007	0.000	0.000	0.000	0.000	0.000
	2008	0.000	0.000	0.000	0.000	0.000
	2009	0.000	0.000	0.000	0.000	0.000

## Notes:

ROG = reactive organic compounds

NOx = oxides of nitrogen

CO = carbon monoxide

SOx = sulfur oxides

PM10 = inhalable particulate matter (below 50 microns aerodynamic equivalent diameter); the "10" in PM10 is a 50% mass collection efficiency size for sampling devices, not a size limit

# ANNUAL CONSTRUCTION EMISSIONS, KAHUKU TRAINING AREA CONSTRUCTION PROJECTS

		CONSTRUCTION ACTIVITY EMISSIONS, TONS PER YEAR					
PROJECT	YEAR	ROG	NOx	CO	SOx	PM10	
VEHICLE WASH FACILITY	2004	0.00	0.00	0.00	0.00	0.00	
	2005	0.00	0.00	0.00	0.00	0.00	
	2006	0.00	0.00	0.00	0.00	0.00	
	2007	0.83	8.21	3.58	0.74	8.05	
	2008	0.15	1.45	0.58	0.13	1.60	
	2009	0.00	0.00	0.00	0.00	0.00	
FIXED TACTICAL INTERNET	2004	0.000	0.000	0.000	0.000	0.000	
	2005	0.005	0.046	0.019	0.004	0.007	
	2006	0.000	0.000	0.000	0.000	0.000	
	2007	0.000	0.000	0.000	0.000	0.000	
	2008	0.000	0.000	0.000	0.000	0.000	
	2009	0.000	0.000	0.000	0.000	0.000	
TOTAL C DV VE AD	2004	0.000	0.000	0.000	0.000	0.000	
TOTALS BY YEAR		0.000	0.000	0.000	0.000	0.000	
	2005	0.005	0.046	0.019	0.004	0.007	
	2006	0.000	0.000	0.000	0.000	0.000	
	2007	0.826	8.211	3.579	0.739	8.048	
	2008	0.150	1.452	0.583	0.130	1.602	
	2009	0.000	0.000	0.000	0.000	0.000	

Notes:

ROG = reactive organic compounds

NOx = oxides of nitrogen

CO = carbon monoxide

SOx = sulfur oxides

PM10 = inhalable particulate matter (below 50 microns aerodynamic equivalent diameter); the "10" in PM10 is a 50% mass collection efficiency size for sampling devices, not a size limit

# ANNUAL CONSTRUCTION EMISSIONS, KAHUKU TRAINING AREA RANGE CONSTRUCTION PROJECTS

		CONSTRUCTION ACTIVITY EMISSIONS, TONS PER YEAR					
PROJECT	YEAR	ROG	NOx	CO	SOx	PM10	
CACTF FACILITY	2004	0.00	0.00	0.00	0.00	0.00	
	2005	2.31	21.50	9.06	1.93	3.31	
	2006	1.25	11.71	5.13	1.07	2.91	
	2007	0.25	2.33	1.05	0.21	0.75	
	2008	0.00	0.00	0.00	0.00	0.00	
	2009	0.00	0.00	0.00	0.00	0.00	
TOTALS BY YEAR	2004	0.00	0.00	0.00	0.00	0.00	
	2005	2.31	21.50	9.06	1.93	3.31	
	2006	1.25	11.71	5.13	1.07	2.91	
	2007	0.25	2.33	1.05	0.21	0.75	
	2008	0.00	0.00	0.00	0.00	0.00	
	2009	0.00	0.00	0.00	0.00	0.00	

## Notes:

ROG = reactive organic compounds

NOx = oxides of nitrogen

CO = carbon monoxide

SOx = sulfur oxides

PM10 = inhalable particulate matter (below 50 microns aerodynamic equivalent diameter); the "10" in PM10 is a 50% mass collection efficiency size for sampling devices, not a size limit

# ANNUAL CONSTRUCTION EMISSIONS, POHAKULOA TRAINING AREA CONSTRUCTION PROJECTS

PROJECT YEAR  RANGE MAINTENANCE BUILDING  2004 2005 2006 2007 2008 2009  AMMUNITION STORAGE AREA  2004 2005 2006 2007 2008 2009  PTA VEHICLE WASH FACILITY  2004 2005 2006 2007 2008 2009  BRADSHAW AIRFIELD UPGRADE 2005 2006 2007 2008 2009	0.00 0.83 1.06 0.17 0.00 0.00 0.00 0.00 0.89 0.16	0.00 7.99 9.78 1.64 0.00 0.00	0.00 3.41 4.13 0.68 0.00 0.00	0.00 0.72 0.88 0.15 0.00 0.00	0.00 2.33 2.09 0.33 0.00 0.00
2005 2006 2007 2008 2009  AMMUNITION STORAGE AREA 2004 2005 2006 2007 2008 2009  PTA VEHICLE WASH FACILITY 2004 2005 2006 2007 2008 2009  BRADSHAW AIRFIELD UPGRADE 2004 2005 2006	0.83 1.06 0.17 0.00 0.00 0.00 0.00 0.89 0.16	7.99 9.78 1.64 0.00 0.00	3.41 4.13 0.68 0.00 0.00	0.72 0.88 0.15 0.00 0.00	2.33 2.09 0.33 0.00
2005 2006 2007 2008 2009  AMMUNITION STORAGE AREA 2004 2005 2006 2007 2008 2009  PTA VEHICLE WASH FACILITY 2004 2005 2006 2007 2008 2009  BRADSHAW AIRFIELD UPGRADE 2004 2005 2006	0.83 1.06 0.17 0.00 0.00 0.00 0.00 0.89 0.16	7.99 9.78 1.64 0.00 0.00	3.41 4.13 0.68 0.00 0.00	0.72 0.88 0.15 0.00 0.00	2.33 2.09 0.33 0.00
2006   2007   2008   2009	1.06 0.17 0.00 0.00 0.00 0.00 0.89 0.16	9.78 1.64 0.00 0.00	4.13 0.68 0.00 0.00	0.88 0.15 0.00 0.00	2.09 0.33 0.00
2007 2008 2009  AMMUNITION STORAGE AREA 2004 2005 2006 2007 2008 2009  PTA VEHICLE WASH FACILITY 2004 2005 2006 2007 2008 2009  BRADSHAW AIRFIELD UPGRADE 2004 2005 2006	0.17 0.00 0.00 0.00 0.00 0.89 0.16	1.64 0.00 0.00	0.68 0.00 0.00	0.15 0.00 0.00	0.33 0.00
2008 2009  AMMUNITION STORAGE AREA  2004 2005 2006 2007 2008 2009  PTA VEHICLE WASH FACILITY  2004 2005 2006 2007 2008 2009  BRADSHAW AIRFIELD UPGRADE 2005 2006 2007 2008 2009	0.00 0.00 0.00 0.00 0.89 0.16	0.00 0.00 0.00	0.00 0.00	0.00 0.00	0.00
AMMUNITION STORAGE AREA  2004 2005 2006 2007 2008 2009  PTA VEHICLE WASH FACILITY  2004 2005 2006 2007 2008 2009  BRADSHAW AIRFIELD UPGRADE 2005 2006 2007 2008 2009	0.00 0.00 0.00 0.89 0.16	0.00	0.00	0.00	
AMMUNITION STORAGE AREA  2004 2005 2006 2007 2008 2009  PTA VEHICLE WASH FACILITY  2004 2005 2006 2007 2008 2009  BRADSHAW AIRFIELD UPGRADE 2005 2006 2007 2008 2009	0.00 0.00 0.89 0.16	0.00			0.00
2005 2006 2007 2008 2009 PTA VEHICLE WASH FACILITY 2004 2005 2006 2007 2008 2009 BRADSHAW AIRFIELD UPGRADE 2004 2005 2006	0.00 0.89 0.16		0.00		
2006 2007 2008 2009  PTA VEHICLE WASH FACILITY 2004 2005 2006 2007 2008 2009  BRADSHAW AIRFIELD UPGRADE 2005 2006	0.89 0.16	0.00		0.00	0.00
2007 2008 2009  PTA VEHICLE WASH FACILITY 2004 2005 2006 2007 2008 2009  BRADSHAW AIRFIELD UPGRADE 2005 2006	0.16		0.00	0.00	0.00
2008 2009  PTA VEHICLE WASH FACILITY  2004 2005 2006 2007 2008 2009  BRADSHAW AIRFIELD UPGRADE  2004 2005 2006		8.45	3.74	0.77	2.62
PTA VEHICLE WASH FACILITY  2004 2005 2006 2007 2008 2009  BRADSHAW AIRFIELD UPGRADE 2004 2005 2006		1.49	0.61	0.13	0.55
PTA VEHICLE WASH FACILITY  2004 2005 2006 2007 2008 2009  BRADSHAW AIRFIELD UPGRADE 2005 2006	0.00	0.00	0.00	0.00	0.00
2005 2006 2007 2008 2009 BRADSHAW AIRFIELD UPGRADE 2004 2005 2006	0.00	0.00	0.00	0.00	0.00
2005 2006 2007 2008 2009 BRADSHAW AIRFIELD UPGRADE 2004 2005 2006	0.00	0.00	0.00	0.00	0.00
2006 2007 2008 2009 BRADSHAW AIRFIELD UPGRADE 2004 2005 2006		0.00	0.00	0.00	0.00
2007 2008 2009 BRADSHAW AIRFIELD UPGRADE 2004 2005 2006		8.21	3.58	0.74	6.51
2008 2009 BRADSHAW AIRFIELD UPGRADE 2004 2005 2006		1.45	0.58	0.13	1.29
2009  BRADSHAW AIRFIELD UPGRADE 2004 2005 2006		0.00	0.00	0.00	0.00
BRADSHAW AIRFIELD UPGRADE 2004 2005 2006		0.00	0.00	0.00	0.00
2005 2006	0.00	0.00	0.00	0.00	0.00
2006	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00
2007	2.05	19.91	8.14	1.79	2.26
	0.37	3.56	1.46	0.32	0.52
2008	0.00	0.00	0.00	0.00	0.00
2009		0.00	0.00	0.00	0.00
PTA I3A FACILITIES 2004	0.00	0.00	0.00	0.00	0.00
2005		6.84	4.77	0.61	1.07
2006		0.51	0.20	0.05	0.08
2007		0.00	0.00	0.00	0.00
2008		0.00	0.00	0.00	0.00
2009		0.00	0.00	0.00	0.00
FIXED TACTICAL INTERNET 2004	0.00	0.00	0.00	0.00	0.00
FIXED TACTICAL INTERNET 2004 2005		0.00	0.10	0.00	0.00
2005		0.24	0.10	0.02	0.03
2007		0.00	0.00	0.00	0.00
2008		0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00
TOTAL C BY VEAD	0.00	0.00	0.00	0.00	0.00
TOTALS BY YEAR 2004		0.00	0.00	0.00	0.00
2005		15.06	8.27	1.35	3.43
2006		46.87	19.80	4.22	13.56
2007		8.14	3.33	0.73	2.69
2008	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00

### Notes:

ROG = reactive organic compounds

NOx = oxides of nitrogen

CO = carbon monoxide

SOx = sulfur oxides

PM10 = inhalable particulate matter (below 50 microns aerodynamic equivalent diameter); the "10" in PM10 is a 50% mass collection efficiency size for sampling devices, not a size limit

#### ANNUAL CONSTRUCTION EMISSIONS, POHAKULOA TRAINING AREA RANGE CONSTRUCTION PROJECTS

BATTLE AREA COMPLEX  2004 2005 18.31 156.67 2006 1.96 18.92 2007 2009 2008 2009 2009 2008 2009 2009 2008 2009 2009			CONSTRUCTION ACTIVITY EMISSIONS, TONS PER YEAR					
2005	PROJECT	YEAR	ROG	NOx	CO	SOx	PM10	
2005								
ANTI-ARMOR LIVE FIRE RANGE 2004 3.94 36.79 15.97 3.27 6.10 2005 2.21 20.27 8.35 1.80 3.97 2006 1.30 12.18 5.34 1.12 2.79 2007 0.00 0.00 0.00 0.00 0.00 0.00 0.00	BATTLE AREA COMPLEX							
ANTI-ARMOR LIVE FIRE RANGE 2004 3.94 36.79 15.97 3.27 6.10 2005 2.21 20.27 8.35 1.80 3.97 2006 1.30 12.18 5.34 1.12 2.79 2007 2008 2009 2009 2009 2009 2009 2009 2009								
ANTI-ARMOR LIVE FIRE RANGE  2004 2005 2.21 20.27 2007 2006 1.30 12.18 5.34 1.12 2.79 2007 2008 2009  QTR2 RANGE  2004 0.00 0.00 0.00 0.00 0.00 0.00 0.0								
ANTI-ARMOR LIVE FIRE RANGE  2004 2005 2.21 20.27 8.35 1.80 3.97 2006 1.30 12.18 5.34 1.12 2.79 2007 0.00 0.00 0.00 0.00 0.00 0.00 0.00			0.00	0.00	0.00	0.00	0.00	
ANTI-ARMOR LIVE FIRE RANGE  2004  2005  2 221  20 27  2006  1 30  1 2.18  5 34  1 1.12  2 79  2007  2008  2009  2009  QTR2 RANGE  2004  2005  2 30  2009  QTR2 RANGE  2004  2005  2 30  2009  QTR2 RANGE  2004  2005  2 30  2009  2006  0 .21  2007  2008  2008  2009  ALTERNATIVE 1 TOTALS BY YEAR  2004  2004  7.02  2052  2065  20.52  176.94  76.75  15.18  42.27  2006  3.26  3.110  13.08  2.86  6.01  2007  0.00								
ALTERNATIVE 1 TOTALS BY YEAR  2004 2007 2009  ALTERNATIVE 2 TOTALS BY YEAR  2004 2008 2009  ALTERNATIVE 2 TOTALS BY YEAR  2004 2007 2007 2007 2007 2007 2000 2008 2009  ALTERNATIVE 2 TOTALS BY YEAR  2004 2005 2006 2006 2006 2007 2007 2000 2008 2009  ALTERNATIVE 2 TOTALS BY YEAR  2004 2005 2006 2006 2006 2007 2007 2007 2007 2007		2009						
ALTERNATIVE 1 TOTALS BY YEAR  2004 2007 2008 2009  ALTERNATIVE 2 TOTALS BY YEAR  2004 2007 2008 2009  ALTERNATIVE 2 TOTALS BY YEAR 2004 2005 2008 2009  ALTERNATIVE 2 TOTALS BY YEAR 2004 2005 2006 2007 2008 2009  ALTERNATIVE 2 TOTALS BY YEAR 2004 2005 2006 2007 2008 2009  ALTERNATIVE 2 TOTALS BY YEAR 2004 2005 2008 2009  ALTERNATIVE 2 TOTALS BY YEAR 2004 2007 2008 2009  ALTERNATIVE 2 TOTALS BY YEAR 2004 2007 2008 2009  ALTERNATIVE 2 TOTALS BY YEAR 2004 2007 2008 2009 2009 2008 2009 2009 2009 2008 2009 2009	ANTI-ARMOR LIVE FIRE RANGE	2004	3.94	36.79	15.97	3.27	6.10	
QTR2 RANGE  2004 2005 2006 2005 2.30 2019 2007 2008 2007 20006 0.21 2.09 0.00 0.00 0.00 0.00 0.00 0.00 0.00		2005	2.21	20.27	8.35	1.80	3.97	
QTR2 RANGE 2004 0.00 0.00 0.00 0.00 0.00 0.00 2005 2.30 20.91 8.59 1.85 3.52 2006 0.21 2.09 0.86 0.19 0.27 2007 0.00 0.00 0.00 0.00 0.00 0.00		2006	1.30	12.18	5.34	1.12	2.79	
QTR2 RANGE  2004 2005 2005 2.30 20.91 8.59 1.85 3.52 2006 0.21 2.09 0.86 0.19 0.27 2007 0.00 0.00 0.00 0.00 0.00 0.00		2007	0.00	0.00	0.00	0.00	0.00	
QTR2 RANGE  2004 2005 2.30 2.091 8.59 1.85 3.52 2006 0.21 2.09 0.86 0.19 0.00 0.00 2008 2009  2009  ALTERNATIVE 1 TOTALS BY YEAR  2004 2005 2006 3.26 3.10 13.08 2.86 6.01 2007 0.00 0.00 0.00 0.00 0.00 0.00 0.00		2008						
ALTERNATIVE 1 TOTALS BY YEAR  2004  ALTERNATIVE 1 TOTALS BY YEAR  2004  2007  2006  2008  2009  2008  2009  2008  2009  2008  2009  2008  2009  2008  2009  2008  2009  2008  2009  2008  2009  2008  2009  2008  2009  2008  2009  2008  2009  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000		2009						
ALTERNATIVE 1 TOTALS BY YEAR  2004  ALTERNATIVE 1 TOTALS BY YEAR  2004  2007  2006  2008  2009  2008  2009  2008  2009  2008  2009  2008  2009  2008  2009  2008  2009  2008  2009  2008  2009  2008  2009  2008  2009  2008  2009  2008  2009  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000  2008  2000								
ALTERNATIVE 1 TOTALS BY YEAR  2004 2007 2008 2009  2004 7.02 65.01 28.36 5.78 22.05 2005 2006 3.26 31.10 13.08 2.86 6.01 2007 0.00 0.00 2008 0.00 0.00 0.00 0.00 0.00	QTR2 RANGE							
ALTERNATIVE 1 TOTALS BY YEAR  2004  7.02  65.01  28.36  5.78  22.05  2005  2005  2006  3.26  31.10  13.08  2.86  6.01  2007  0.00								
ALTERNATIVE 1 TOTALS BY YEAR  2004  7.02  65.01  28.36  5.78  22.05  2005  2005  20.52  176.94  76.75  15.18  42.27  2006  3.26  31.10  13.08  2.86  6.01  2007  0.00								
ALTERNATIVE 1 TOTALS BY YEAR  2004  7.02  65.01  28.36  5.78  22.05  2005  20.52  176.94  76.75  15.18  42.27  2006  3.26  31.10  13.08  2.86  6.01  2007  0.00			0.00	0.00	0.00	0.00	0.00	
ALTERNATIVE 1 TOTALS BY YEAR  2004  7.02  65.01  28.36  5.78  22.05  2005  20.52  176.94  76.75  15.18  42.27  2006  3.26  31.10  13.08  2.86  6.01  2007  0.00								
2005 20.52 176.94 76.75 15.18 42.27 2006 3.26 31.10 13.08 2.86 6.01 2007 0.00 0.00 0.00 0.00 0.00 0.00 2008 0.00 0.00		2009						
2005 20.52 176.94 76.75 15.18 42.27 2006 3.26 31.10 13.08 2.86 6.01 2007 0.00 0.00 0.00 0.00 0.00 0.00 2008 0.00 0.00	ALTEDNATIVE 1 TOTAL C DV VEAD	2004	7.02	65.01	29.26	<i>5</i> 70	22.05	
ALTERNATIVE 2 TOTALS BY YEAR  2006 2007 0.00 0.00 0.00 0.00 0.00 0.00 0.00	ALTERNATIVE I TOTALS BY TEAK							
2007   0.00								
2008 2009 0.00 0.00 0.00 0.00 0.00 0.00 0.00								
2009 0.00 0.00 0.00 0.00 0.00 0.00  ALTERNATIVE 2 TOTALS BY YEAR 2004 7.02 65.01 28.36 5.78 22.05 2005 22.82 197.85 85.34 17.03 45.79 2006 3.47 33.19 13.94 3.05 6.28 2007 0.00 0.00 0.00 0.00 0.00								
ALTERNATIVE 2 TOTALS BY YEAR 2004 7.02 65.01 28.36 5.78 22.05 2005 22.82 197.85 85.34 17.03 45.79 2006 3.47 33.19 13.94 3.05 6.28 2007 0.00 0.00 0.00 0.00 0.00								
2005     22.82     197.85     85.34     17.03     45.79       2006     3.47     33.19     13.94     3.05     6.28       2007     0.00     0.00     0.00     0.00     0.00			****					
2005     22.82     197.85     85.34     17.03     45.79       2006     3.47     33.19     13.94     3.05     6.28       2007     0.00     0.00     0.00     0.00     0.00     0.00	ALTERNATIVE 2 TOTALS BY VEAR	2004	7.02	65.01	28 36	5.78	22.05	
2006         3.47         33.19         13.94         3.05         6.28           2007         0.00         0.00         0.00         0.00         0.00         0.00	ALILAMATIVE 2 TOTALS BY TEAR							
2007 0.00 0.00 0.00 0.00 0.00								
1 2008 1 0.00 0.00 0.00 0.00 0.00		2008	0.00	0.00	0.00	0.00	0.00	
2009 0.00 0.00 0.00 0.00 0.00								
		2309		0.00	0.00	0.00	3.00	

Notes:

ROG = reactive organic compounds NOx = oxides of nitrogen

CO = carbon monoxide

PM10 = inhalable particulate matter (below 50 microns aerodynamic equivalent diameter); the "10" in PM10 is a 50% mass collection efficiency size for sampling devices, not a size limit

# ESTIMATED EMISSIONS FOR CONSTRUCTION OF POHAKULOA TANK TRAIL

## **EQUIPMENT USE SUMMARY:**

					OFF-SITE FII	LL HAULING
PROJECT STAGE	ACTIVITY DURATION, DAYS	ACREAGE SUBJECT TO DISTURBANCE	NUMBER OF EQUIPMENT ITEMS	CUMULATIVE HOURS OF EQUIP USE	TRUCK LOADS TO/ FROM SITE	TYPICAL LOADS PER DAY
RIGHT-OF-WAY CLEARING	200	126.0	15	12,480	850	4
ROADBED GRADING	200	163.6	45	39,850	12,426	62
ROAD SURFACING	167	83.3	51	33,792	20,149	122
	0	0.0	0	0	0	0
TOTALS OR AVERAGES:	250	163.6	82	86,122	33,425	134

Linear work progressions with overlap among activity stages reduces the total construction period to about 250 workdays (March 2006 - March 2007).

## TYPICAL CONSTRUCTION DAY EMISSIONS:

		DAILY EMISSIONS, POUNDS PER DAY					
PROJECT STAGE	COMPONENT	ROG	NOx	CO	SOx	PM10	
RIGHT-OF-WAY CLEARING	Equipment	25.9	248.8	98.4	22.0	23.7	
	Fugitive Dust	0.0	0.0	0.0	0.0	20.6	
ROADBED GRADING	Equipment	50.0	527.8	197.6	50.1	50.0	
	Fugitive Dust	0.0	0.0	0.0	0.0	35.8	
ROAD SURFACING	Equipment	46.2	486.6	169.4	45.0	42.6	
	Fugitive Dust	0.0	0.0	0.0	0.0	14.0	
	Equipment	0.0	0.0	0.0	0.0	0.0	
	Fugitive Dust	0.0	0.0	0.0	0.0	0.0	

## CUMULATIVE CONSTRUCTION EMISSIONS:

		CUMULATIVE EMISSIONS, TONS PER YEAR					
PROJECT STAGE	COMPONENT	ROG	NOx	CO	SOx	PM10	
DIGHT OF WAY OF FARRIC		2.50	24.00	0.04	2.20	2.27	
RIGHT-OF-WAY CLEARING	Equipment	2.59	24.88	9.84	2.20	2.37	
	Fugitive Dust	0.00	0.00	0.00	0.00	2.06	
ROADBED GRADING	Equipment	5.00	52.78	19.76	5.01	5.00	
	Fugitive Dust	0.00	0.00	0.00	0.00	3.58	
ROAD SURFACING	Equipment	3.86	40.63	14.15	3.76	3.56	
	Fugitive Dust	0.00	0.00	0.00	0.00	1.17	
	Equipment	0.00	0.00	0.00	0.00	0.00	
	Fugitive Dust	0.00	0.00	0.00	0.00	0.00	
TOTAL C		44.45	110.20	42.54	10.00	10.00	
TOTALS	Equipment Fugitive Dust	11.45 0.00	118.29 0.00	43.74 0.00	10.96 0.00	10.92 6.81	
	r ugitive Dust	0.00	3.00	0.00	0.00	0.01	
	TOTALS	11.45	118.29	43.74	10.96	17.74	